

REMARKS

Claims 1-14 are pending in the application, of which, claims 5, 6, 13 and 14 have been withdrawn from consideration. Claims 1-4 and 7-12 stand rejected. Claim 1 has been amended. In view of the amendments to the claims and the following remarks, Applicants respectfully request that the rejections be withdrawn and that the claims be allowed.

Claims 1-4, 7-10 and 12 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,560,259 to Hwang ("Hwang"). The rejection is traversed.

Claim 1 recites a laser comprising a substrate that includes a bulk region and a conducting layer. The laser also includes an active region that comprises "a quantum cascade structure provided on a first surface of the substrate such that said active region is electrically connected to said conducting layer." The active region forms "a strip on said first surface of the substrate," and said strip has "a cleaved facet at each end." The active region is electrically connected to said conducting layer via first and second contacts, "said first and second contacts being disposed on opposite sides of said active region." The laser also includes "an active region contact provided to said active region such that a potential may be applied between said active region contact and said first and second contacts to cause said active region to lase." The active region contact is "a metal contact provided overlying said active region on a surface parallel to said first surface of the substrate." "[E]mission from said laser is collected from one of said cleaved facets of said active region." This is illustrated in figure 3 of the present application, which illustrates a laser according to claim 1. In figure 3, a top contact 31 or active region contact is formed on the upper surface of the active region 11. Application, ¶ [0073]. The top contact 31 is parallel to the "first surface of the substrate." Application, fig. 3. The active region 11 is "a strip or ridge 15 on the surface of said conducting layer 14." Application, ¶ [0063]. The strip includes cleaved facets such as Fabry-Perot cavities. Application, ¶ [0078]. The resulting laser, therefore, must be of an edge-emitting type and not of a surface-emitting type. As explained below, Hwang does not disclose these limitations.

Hwang relates to a surface-emitting laser. Hwang, Abstract. Hwang does not disclose an edge-emitting laser with the recited active region contact that is a “metal contact provided overlying said active region on a surface parallel to said first surface of the substrate.” *See* Hwang, fig. 1. Similarly, Hwang fails to disclose that the active region is a strip “having a cleaved facet at each end.” Therefore, Hwang also fails to disclose that “emission from said laser is collected from one of said cleaved facets of said active region.” The use of an edge-emitting laser with the novel contact arrangement, as recited in claim 1, allows for a lower series resistance and thus is advantageously used for generating continuous wavelength (“CW”) terahertz frequencies. On the other hand, generation of CW terahertz frequencies using a surface-emitting laser, such as in Hwang, is hampered because the use of thicker active layers (required to generate terahertz frequencies) creates an increased series resistance in a surface-emitting laser. Thus, a person of ordinary skill in the art would not look to surface-emitting lasers when improving edge-emitting lasers.

Furthermore, claim 1 of the present application recites that the active region contact is “a metal contact provided overlying said active region on a surface parallel to said first surface of the substrate.” The resulting parallel surfaces act as a waveguide for the recited edge-emitting laser which further overcome the loss associated with surface gratings and surface-emitting lasers. *See, e.g.,* Application, ¶ [0068]. Therefore, for this additional reason, the invention recited by claim 1 of the present application is not anticipated by Hwang, which only discloses a surface-emitting laser with its inherent disadvantages.

Accordingly, Hwang fails to anticipate claim 1. Claim 1 is thus allowable over Hwang. Claims 2-4, 7-10 and 12 depend from claim 1 and are allowable for at least the same reasons that claim 1 is allowable. Applicants respectfully request that the rejections be withdrawn and that the claims be allowed.

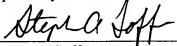
Claim 11 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Hwang. The rejection is traversed. Claim 11 depends from claim 1. As explained above, claim 1 is allowable over Hwang. Therefore, for at least the same reasons that claim 1 is allowable, claim 11

is also allowable. Accordingly, Applicants respectfully request that the rejection be withdrawn and that the claim be allowed.

In view of the above, Applicants believe the pending application is in condition for allowance. If there are any additional charges in connection with this filing or any subsequent filings (including but not limited to issue fees), the Examiner is respectfully requested and authorized to charge Deposit Account No. 04-1073 therefor under Order No. M0025.0325/P325.

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